STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY

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METHODS FOR TESTING TWO-COMPONENT MACHINE-MIXED POLYURETHANE SEALANTS

CAUTION: Prior to handling test materials, performing equipment setups, and/or conducting this method, testers are required to read "**SAFETY AND HEALTH**" in Section E of this method. It is the responsibility of the user of this method to consult and use departmental safety and health practices and determine the applicability of regulatory limitations before any testing is performed.

A. SCOPE

These test methods describe procedures for evaluating two-component, machine-mixed polyurethane joint sealant used for filling joints in concrete structures where movement occurs.

B. MIXING MATERIAL FOR TEST SPECIMENS

Combine equal volumes of the two component sealant so that the total volume is 250 mL or less. Vigorously mix these materials for 45 s by hand, using a stiff, square-tipped spatula, approximately 25-mm wide. During the mixing, incorporate as little air as possible. Within 30 s after final mixing, pour the samples into the prepared molds. Do not scrape the sides of mixing vessel. More than one mix may be required to prepare all specimens.

C. TEST SAMPLE PREPARATION

1. Prime one surface of 25 by 50 by 75-mm test blocks, fabricated according to California Test 413, with primer furished by the sealant manufacturer. Prepare four 12.5 by 12.5 by 50-mm specimens of sealant using teflon or brass spacers. The 50-mm sides of the sealant shall be centered and parallel to the 50-mm side of the test block. After 24 h at 25 ± 2˚C, place test specimens in an oven at 70˚ ± 1˚C for 7 days. Condition the samples for 8 h at 25 ± 2˚C before testing.

2. Cast a smooth sheet of sealant 3.2-mm thick against a sheet of mylar plastic. Cure the samples for 24 h at 25 ± 2˚C, followed by 48 h at 70 ± 1˚C. Cut a tensile test specimen as required in California Test 434.

D. TEST PROCEDURE

1. Modulus Determination: Place a dry bond specimen, prepared as in Section C - 1, in a suitable tensile testing machine having jaws capable of gripping the concrete blocks. Extend the specimen, at the rate of 5.0 mm/min, to a width of 32 mm (150 % extension). Measure the stress, in Pa. The modulus is the average of the two stress determinations.

2. Recovery at 25˚C: After the modulus determination, insert the 32-mm spacers between the concrete blocks to maintain 150 % extension. Condition the specimens for 7 days at 25 ± 2˚C. Remove the spacers and place the test specimens on a glass surface so that the two 25 by 75-mm surfaces of each specimen bear directly on

the glass. At 2, 3, and 5-min intervals, lift the test specimen carefully to help relieve any friction which may restrict the recovery of the sealant. Measure the width (the distance between the 50 by 75-mm face) of the blocks on the sealant 5 min after relaxation.

3. Notching Test: Again extend the test specimens to 32 mm, insert the 32-mm spacers, and cut a notch about 1.6-mm deep, parallel to the 75-mm block dimension and across the center of the sealant surface. Examine the sealant 24 h later for degrees of failure in cohesion or adhesion.

4. Water Resistance Test: Extend two specimens 100 % at 25 mm. Insert the 25-mm spacers, and the specimens immerse in distilled water at 25 ± 2˚C for 7 days. Observe for tearing or loss of adhesion. Record the elapsed time when a tear or loss of bond exceeds 6.5 mm.

5. Ultraviolet Exposure Test: Place the tensile test specimen in a jig which will extend the center from 25 to 50 mm (100 % elongation of the center section). Mount this jig in an Accelerated Weathering Cabinet and test according to ASTM Designation: G 53. The cabinet shall cycle between 4 h of ultraviolet exposure at 60˚C, and 4 h of condensate exposure at 40˚C. A minimum of 200 h of this cyclic exposure is required. Type FS-40 (Ultraviolet-B) bulbs are used at an irradiance level of 0.47 $W/m^2/nm$ at 310 nm, as measured at the sample surface during the ultraviolet cycle. After 200 h of exposure, no more than slight cracking or checking of the specimen is acceptable.

6. Grease Cone Penetration Test: Use the procedure specified in California Test 413.

E. SAFETY AND HEALTH

This method may involve the use of toxic chemicals, including isocyanates. Review the Material Safety Data Sheet before handling the product. Wear an approved respirator and work in an exhaust hood whenever possible. Eye protection and gloves should be worn. When curing specimens in an oven, be sure to provide adequate ventilation around the oven or place the oven in an exhaust hood. Observe good hygiene practices. Wash hands after handling samples and before eating, drinking or smoking.

Prior to handling, testing or disposing of any sample, testers are required to read the Caltrans Laboratory Safety Manual. This manual contains information on; general safety principles, standard operating procedures, protective apparel, disposal of materials and how to handle spills, accidents, emergencies, etc. Users of this method do so at their own risk.

REFERENCES:

California Tests 413 and 434

End of Text (California Test 435 contains 2 pages)